SP-021

manual for condition rating of surface-treated pavements

Technical Report Documentation Page

Manual for Condition Rating of Surface-Treated Pavements – Distress Manifestations

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Abstract:	Most highway authorities use highway pavement surface condition ratings to judge the pavement's ability to continue providing required service to the public. Riding quality and distress manifestations are the bases of the pavement condition rating scheme used in Ontario by the Ministry of Transportation. However, the scheme is designed only for asphaltic-concrete or Portland-cement-concrete roads; there is no scheme designed and developed specifically to address the unique performance pattern of surface-treated roads. This document was prepared to meet this pavement management need and to present a pavement surface condition rating scheme for surface-treated roads, also using riding quality and distress manifestations as its bases.
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manual for condition rating of surface-treated pavements distress manifestations

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1/ Introduction

Rating of highway pavement surface condition is used in one form or another by most highway authorities as a measure of the ability of the pavement to continue to provide required service to the public. The most important applications for condition ratings are their uses in programming and in determining deficiencies, inadequacies, remedial measures, and fiscal needs. The pavement condition rating scheme used in Ontario by the Ministry of Transportation is based on two interrelated measures: riding quality and distress manifestations [1,2,3].

In addition to managing a network of roads surfaced with asphaltic concrete and Portland-cement concrete in the King's Highway System, the Ministry must also manage a network of bituminous surface-treated roads to serve smaller and more remote population centres in the province. The existing pavement condition rating scheme used in Ontario (1,2,3) is, however, designed only for asphaltic-concrete or Portland-cement-concrete roads. To date, there is no scheme designed and developed specifically to address the unique performance pattern of surface-treated roads.

This document was prepared to meet this pavement management need and to present a pavement surface condition rating scheme for surface-treated roads. The scheme is based on the same interrelated measures used on the highway system: the riding quality and distress manifestations.

2/ Pavement Surface Condition Rating Scheme

The rating scheme devised for use in Ontario consists of a rater evaluating two different physical parameters:

- the riding quality of the pavement surface which is the indicator for pavement functional condition, and
- the extent and severity of pavement surface distress manifestations, the indicator for pavement structural condition. (4)

The two physical parameters are interrelated by reason that some distress manifestations result in surface distortion and unevenness which then cause a reduction in riding quality. A prime example is pavement surface distortion from frost action resulting in a rough ride for the road users. However, rougher pavements cause vehicles to produce higher dynamic wheel loads thus increasing stresses, strains, and deflections, and hastening pavement deterioration. Not all distress manifestations are accompanied by distortion or unevenness. The type, density and severity of distress are very useful indicators of structural inadequacy, materials deficiency and probable rate of subsequent deterioration.

Riding quality is a perceived measure and it is quite practical for the experienced rater to evaluate ride quality. The ability of the rater to provide a subjective measure of ride condition using the guidelines will improve with experience. Mechanical measurements using such roughness devices as the Mays Meter, PURD, or the ARAN may be made in lieu of subjective riding condition rating. However, the numerical value measured by these mechanical devices must be equated to the same subjectively derived riding condition rating scale.

Distress manifestations of pavement surface may be grouped under three main headings:

- surface defects,
- distortion or pavement deformation, and
- cracking

The different distress manifestations have been assigned names, which are listed in Figure 1. Each type of distress is given a description of its physical appearance and an array of possible causes. Each type of distress is evaluated in terms of its density (extent of occurrence) and severity. Uniform word descriptions are given to correspond with each category of density or severity.

Pavement condition rating based on the two physical parameters should reflect the average condition of the pavement section rated. This requires that a road be divided into sections exhibiting relatively uniform performance. In general, sections should start and end at major intersections. A preliminary evaluation of riding quality may enable the rater to identify sections with substantially different qualities and the project may be subdivided by such changes. However, it is suggested that the subsection should not be less than 1.6 kilometres for rural situations, and between two major intersections for urban situations (if uniform in performance appearance). Intersections should be included as part of the evaluation section for both rural and urban situations.

Pavement condition ratings are to be carried out in the late spring and summer months to allow for the effects of frost heaving to dissipate and the pavement to stabilize.

Pavement shoulder distresses, although not directly affecting the pavement surface condition, do contribute to the overall pavement performance. Therefore, evaluation should be made to round out the total performance picture.

The distresses are grouped under the following headings:

- encroaching growth
- poor cross-fall

Maintenance treatments carried out on the pavement surface also contribute directly to the overall pavement performance, especially the pavement functional condition because treatments can and do affect directly the riding quality of the pavement surface. Therefore, reporting on the type and extent of maintenance treatment carried out on the pavement is desirable and necessary.

Although the purpose of the rating scheme is to describe distress manifestations of the pavement, possible corresponding remedial measures are also suggested for maintenance action. However, it should be understood that the possible remedial measures suggested for a deficiency might not necessarily be the most effective maintenance alternatives, nor will they necessarily effectively correct the cause or causes of the distress. The listed remedial measures may only be expedient maintenance treatments to slow the deterioration.

Pavement condition ratings are needed at regular time intervals so that management can be aware of changing conditions and plan maintenance and rehabilitation with confidence. The completeness and uniformity of condition reports should lead to increased confidence in planning. The preferred cycle is one year, but if this is not feasible or economical, the maximum interval is three years.

This pavement surface condition rating scheme is also applicable to municipalities which have surface-treated roads under their jurisdiction. However, the municipalities may require some adjustment of the scheme to suit their particular situations.

Figure 1/ Distress Manifestations and Maintenance Treatment Alternatives

Pavement Distress Manifestation	Evaluation		
	Severity	Density	Other Characteristics
Pavement Surface Defects • Loss of Cover Aggregate • Streaking • Flushing • Potholes • Pavement Edge Breaks **Pavement Surface Deformation** • Rippling • Wheel Track Rutting • Distortion **Pavement Cracking** • Longitudinal • Transverse • Pavement Edge • Alligator			
Shoulder Distress Manifestation			
• Enchroaching Growth • Poor Cross-Fall			
Maintenance Treatment Alternatives			
• Manual Patching • Machine Patching • In Situ Recycling with Manual Chip Seal • Manual Spray Patching • Manual Chip Seal • Machine Chip Seal • Fog Seal • Manual Burn and Seal			

3/ Procedure for Pavement Evaluation

Step 1 To carry out the pavement condition evaluation, drive slowly over the road to visually inspect the overall surface condition of the pavement for uniformity in appearance. If distinctive difference is observed, then the pavement should be subdivided into two (or more) appropriate sections for evaluation.

However, each evaluation section should have a minimum length of 1.6 kilometres (1 mile) for rural situations, and between two major intersections for urban situations. This minimum length requirement is strictly for economic reasons.

Step 2 After establishing the evaluation section, assessment of the pavement functional condition is made by obtaining the Riding Condition Rating (RCR). Riding Condition Rating (RCR) is obtained by averaging the ride quality of both sides of the pavement. Drive over the pavement at the posted speed: if speed limit posted is 80 km/h, then evaluation must be made at 80 km/h. However, if for safety reason the posted speed limit is not advisable, then rating should be made using the safest speed and the condition noted.

Step 3 After assessing the Riding Condition Rating (RCR), assessment of the pavement structural condition is made by driving over the pavement slowly to assess distress manifestations (maximum speed not to exceed 20 km/h for urban situations and 50 km/h for rural situations. Two or three stops per section should be made to examine distress type and severity, particularly surface conditions and deformations.

Step 4 Complete the "Surface-Treated Pavement Condition Evaluation Form" by checking off the "Riding Condition Rating" and all observed distress manifestations, shoulder distress manifestations, and maintenance treatments at their appropriate places (Figure A-1, Appendix A).

Step 5 Pavement Condition Rating (PCR) is assigned according to the guide for the estimation of pavement condition rating for surface-treated roads (Table B-1) given in Appendix B.

4/ Riding Quality (Riding Condition Rating)

The riding quality of a pavement is the degree of riding surface smoothness which the pavement section in question provides to the travelling public. The rater should drive over the pavement section at the posted speed and then classify the pavement's riding surface smoothness according to the descriptions given in Table 1.

The type of passenger vehicle used for performing this Riding Condition Rating has no significant influence on the Rater. This finding was reported in an experimental study conducted by the Ontario Ministry of Transportation in 1968 when over 100 individual raters and different automobile manufacturer's models (G.M.C., Ford, Chrysler, and Volkswagen) and sizes of vehicles were used. (5)

However, a municipality that wishes to use this pavement condition rating scheme for its surface-treated roads may want to establish uniformity of vehicle employed for this purpose. It is suggested that the municipality can utilize the half-ton patrol truck as the standard because this particular vehicle is probably part of all municipal fleets.

The rater should disregard the appearance of the pavement surface when rating riding condition–only the riding surface smoothness of the pavement is relevant. Similarly, the road's class is irrelevant. For example, a connecting link and a residential street should be considered as equal when assessing riding quality.

Table 1/ Riding Condition Rating Guide

RCR	Uniform Description of Riding Condition at Posted Speed (RCR)	Guidelines
8 - 10	Excellent	Very smooth ride
6 - 8	Good	Smooth ride with a few bumps or depressions
4 - 6	Fair	Still comfortable ride with intermittent bumps or depressions
2 - 4	Poor	Uncomfortable ride with frequent bumps or depressions
0 - 2	Very poor	Uncomfortable ride with constant bumps or depressions resulting in rattle and shake of rating vehicle; cannot maintain posted speed and must steer constantly to avoid bumps or depressions

Riding Condition Rating: Very Good (Rural)

Riding Condition Rating: Good (Rural)

Riding Condition Rating: Fair (Urban)

Riding Condition Rating: Fair (Rural)

Riding Condition Rating: Poor (Urban)

Riding Condition Rating: Poor (Rural)

Riding Condition Rating: Very Poor

5/ Distress Manifestations

Distress manifestations are visible signs of pavement structural condition. These distresses indicate problems due to either material deficiencies, construction deficiencies, and environmental and climatic conditions, traffic loading, or other causes. The severity and density of these distresses are good indicators of the problem situation [6,7].

Severity

The term "severity" refers to how bad the problem is. The severity scale, based on past engineering experience, has three levels: Slight, Moderate and Severe. These guidelines give a verbal description of each stage, along with pictorial representations.

Density (Extent of Occurrence)

The term "density" refers to the size of the problem area. The density scale, based on past engineering experience, has three levels: Intermittent, Frequent and Extensive. These guidelines give a verbal description of each stage, based on the percentage of surface area affected and where it is affected.

For example, the rater may encounter the situation where there is a number of potholes all located within a short distance from each other and that this distance within the evaluation section represents less than 20% of the pavement surface area. The "Density" is said to be "Intermittent" (Figure 2).

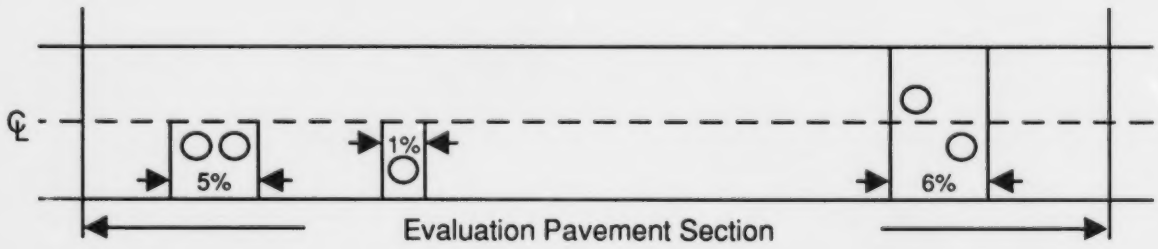


Figure 2/ Intermittent Occurrence of Potholes

On the other hand, if these same potholes are spaced over the length of the evaluation section, it is still "intermittent" because it is only isolated incidence over a few areas of the total pavement surface (Figure 3).

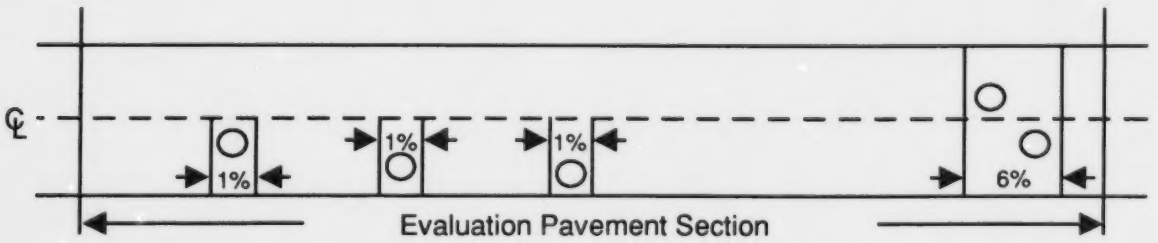


Figure 3/ Intermittent Occurrence of Potholes

However, if potholes are in clusters covering 20 to 50% of the pavement surface, it is labelled "frequent" (Figure 4).

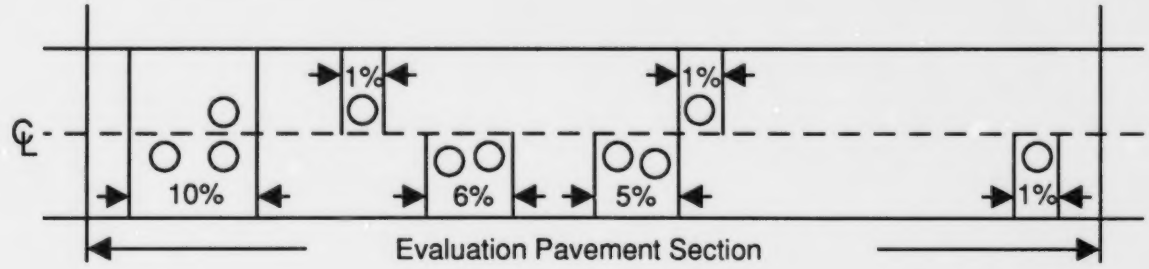


Figure 4/ Frequent Occurrence of Potholes

For "extensive" occurrence, the potholes are present over the length of the pavement section and cover more than 50% of the surface area (Figure 5).

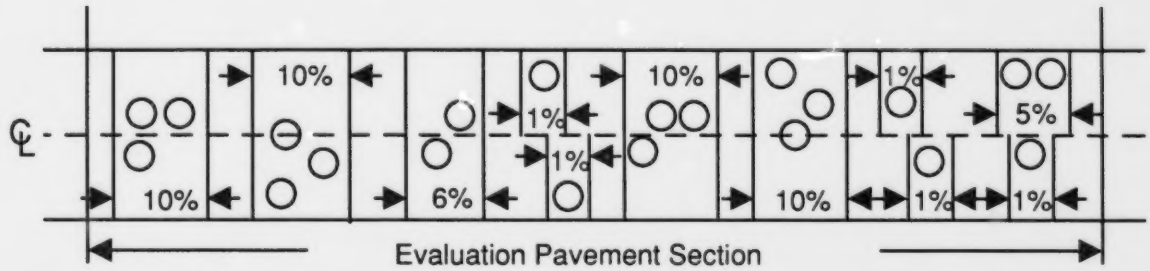


Figure 5/ Extensive Occurrence of Potholes

It should be noted that "coverage" here means that 20 to 50% of the pavement surface area has potholes. It does not mean potholes represent 20 or 50% of the pavement surface. These illustrations serve generally for all distress manifestations.

5.1/ Surface Defects

Loss of Cover Aggregate

Streaking

Flushing

Potholes

Pavement Edge Breaks

Surface Defects

Loss of Cover Aggregate

Description:

The whipping off of cover aggregate under traffic from a surface-treated pavement, leaving only the asphalt.

Possible Causes:

1. Aggregate is not spread immediately (within one minute) after the asphalt is applied to the pavement surface resulting in the asphalt cooling off too much to hold the aggregate.
2. Aggregate is too dusty or wet when spread.
3. Freshly spread aggregate is not rolled immediately.
4. Compaction equipment used improperly; e.g. only steel-wheeled roller is used resulting in aggregate lost from low spots that are bridged over by the roller.
5. Weather is too cool for treatment application.
6. Fast traffic allowed too soon on newly treated pavement.
7. Insufficient asphalt due to absorbent surface being treated.

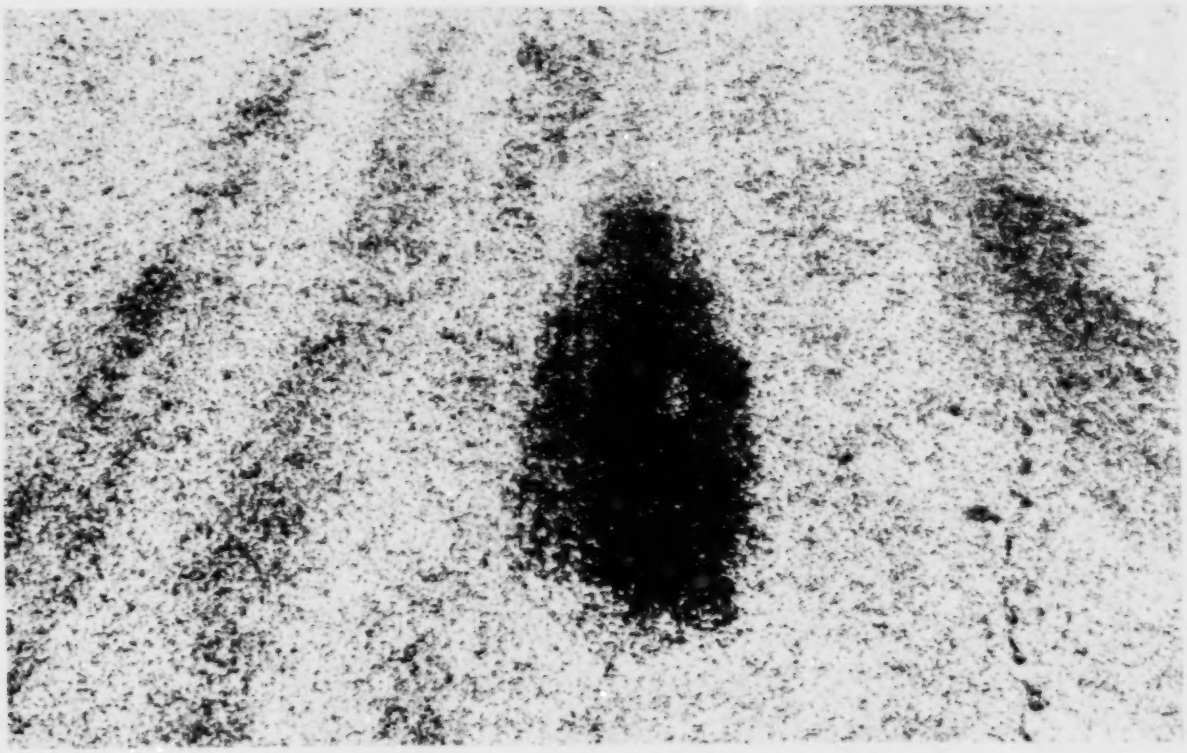
Severity:

Class	Guidelines
Slight	Noticeable loss of cover aggregate.
Moderate	Large patches of cover aggregate lost from the pavement surface, leaving black spots like flushing.
Severe	Complete loss of cover aggregate from the pavement surface.

Density:

Intermittent	Less than 20% of pavement section affected; distress spotted over localized areas only.
Frequent	20 to 50% of pavement section affected; distress spotted evenly over entire length of pavement section or over localized areas only.
Extensive	51% or more of pavement section affected; distress spotted throughout pavement section evenly.

Slight Loss of Cover Aggregate



Moderate Loss of Cover Aggregate

Severe Loss of Cover Aggregate

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• Re-cover with heated aggregate (minimum 150°C) spread over affected areas; follow immediately by rolling
	Frequent	• Same as above
	Extensive	• No action, but consider for Rehabilitation
Severe	Intermittent	• Re-cover with heated aggregate (minimum 150°C) spread over affected areas; follow immediately by rolling
	Frequent	• Same as above, or no action, but place on Rehabilitation Program
	Extensive	• Rehabilitation Program

Streaking

Description:

Alternating lean and heavy lines of asphalt running parallel to the centreline of the road. Sometimes streaking also occurs at right angles to the centreline.

Possible Causes:

1. Incorrect height of spray bar resulting in improper overlapping of spray fans.
2. Incorrect angle of spray bar nozzles, plugged nozzles; generally poor maintenance of spray bar.
3. Incorrect asphalt pump speed; too low pump pressure.
4. Asphalt too cold.
5. Spray bar rising as load in distributor lightens, resulting in incorrect spraying height; generally poor workmanship.

Severity:	**Class**	**Guidelines**
	Slight	Single or double lines streaking on the pavement surface.
	Moderate	Multiple streaking lines on the pavement surface.
	Severe	Alternate lean and heavy lines streaking over the entire pavement surface.

Density:		
	Intermittent	Less than 20% of pavement surface affected; distress spotted over localized area.
	Frequent	20 to 50% of pavement surface affected; distress spotted evenly over pavement section or over localized areas only.
	Extensive	51% or more of pavement surface affected; distress spotted evenly over pavement section.

Slight Transverse Streaking

Moderate Transverse Streaking

Severe Transverse Streaking

Slight Longitudinal Streaking

Moderate Longitudinal Streaking

Severe Longitudinal Streaking

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action, but consider for future Rehabilitation
Severe	Intermittent	• No action • Manual Chip Seal
	Frequent	• No action, but place on Rehabilitation Program • Manual Chip Seal • Machine Chip Seal
	Extensive	• Rehabilitation Program

Surface Defects

Flushing

Description:

Free asphalt migrating upward to the pavement surface. Most likely to occur in the wheel tracks, especially during hot weather.

Possible Causes:

1. Too much asphalt because of incorrect application rate. On hot days, asphalt expands and the traffic forces the asphalt to the surface over the cover aggregate.
2. Surface treatment over flushed pavement without treating the flushed surface. The excess asphalt on the old surface may be pumped up through the new surface-treated pavement over a period of time.
3. Surface was treated over excess prime surfaces.
4. Excessive loss of cover aggregate left only the asphalt.

Severity:	**Class**	**Guidelines**
	Slight	Colouring of pavement surface visible (inter-connected veining).
	Moderate	Distinctive appearance (with excess asphalt already free).
	Severe	Free asphalt gives the pavement surface a wet look; tire marks and tracking are evident; tire noise can be heard.

Density:		
	Intermittent	Less than 20% of pavement surface (wheel tracks) affected; distress spotted over localized areas only.
	Frequent	20 to 50% of pavement surface (wheel tracks) affected; distress spotted evenly over the length of the pavement section or over localized areas only.
	Extensive	51% or more of pavement surface (wheel tracks) affected; distress spotted over the length of pavement section.

Slight Flushing

Moderate Flushing

Severe Flushing

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action, but consider for Rehabilitation Program
Severe	Intermittent	• No action • Manual Burn and Seal
	Frequent	• No action, but consider for Rehabilitation Program
	Extensive	• No action, but place on Rehabilitation Program

Surface Defects

Potholes

Description:

Round or irregular shaped holes in pavement; can be unrelated to other surface defects or a direct result of other defects such as alligator cracking, frost boil, etc.

Possible Causes:

1. Poor construction technique and poor quality control.
2. Poor aggregates in pavement.
3. Result of other defects.

Severity:

Class	Guidelines
Slight	Small (< 100 mm in diameter) and shallow in depth.
Moderate	100 to 300 mm wide and usually more than 50 mm deep.
Severe	More than 300 mm wide and usually more than 100 mm deep.

Density:

Intermittent	Less than 20% of pavement surface affected; distress spotted over localized area only.
Frequent	20 to 50% of pavement surface affected; distress spotted evenly over length of pavement section or over localized areas only.
Extensive	51% or more of pavement surface affected; distress spotted evenly over length of pavement section.

Slight Pothole

Moderate Pothole

Severe Pothole

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• Manual Spray Patching • Manual Chip Seal • Manual Patching
	Frequent	• Manual Spray Patching • Manual Chip Seal
	Extensive	• Manual Patching
Moderate	Intermittent	• Manual Patching
	Frequent	• Manual Patching
	Extensive	• Manual Patching and consider for Rehabilitation Program
Severe	Intermittent	• Manual Patching
	Frequent	• Manual Patching and place on Rehabilitation Program
	Extensive	• Manual Patching and place on Rehabilitation Program

Surface Defects

Pavement Edge Breaks

Description: Edge breaking occurs with or without cracks.

Possible Causes:

1. Frost action.
2. Insufficient bearing support or excessive traffic loading at the pavement edge.
3. Poor drainage at pavement edge and shoulder.
4. Inadequate pavement width forces traffic too close to pavement edge.

Severity:

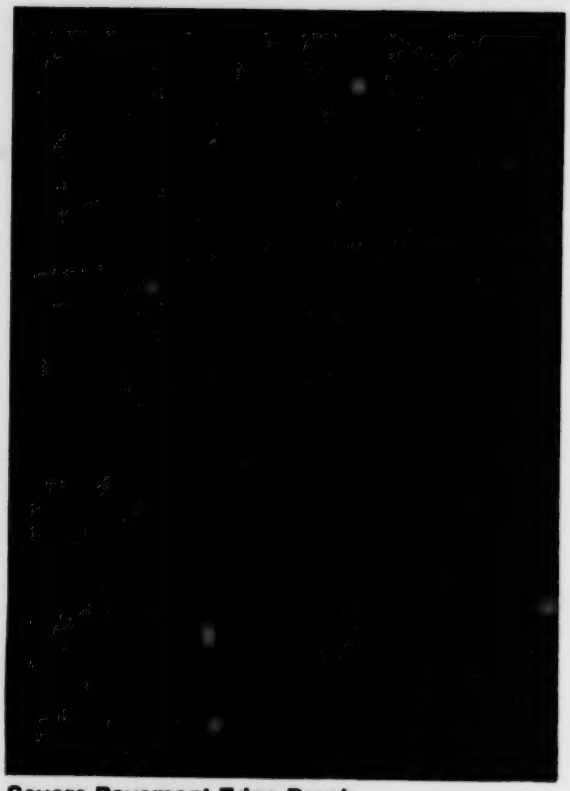
Class	Guidelines
Slight	Small breaks (less than 250 mm); no missing pieces or very few missing pieces.
Moderate	Breaks between 260 and 750 mm; pieces missing giving pavement edge jagged look.
Severe	Large breaks (greater than 750 mm); large pieces missing from pavement edge.

Density:

Intermittent	Less than 20% of pavement edge affected; distress spotted over localized areas only.
Frequent	20 to 50% of pavement edge affected; distress spotted evenly over length of pavement section or over localized areas.
Extensive	51% or more of pavement edge affected; distress spotted evenly over length of pavement section.

Slight Pavement Edge Break

Moderate Pavement Edge Break



Severe Pavement Edge Break

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• Manual Patching
	Frequent	• Manual Patching
	Extensive	• No action, but consider for Rehabilitation Program
Severe	Intermittent	• Manual Patching
	Frequent	• No action, but place on Rehabilitation Program
	Extensive	• Rehabilitation Program

5.2/ Surface Deformation

Rippling

Wheel Track Rutting

Distortion

Surface Deformation

Rippling

Description:

Regular transverse undulations in the pavement surface consisting of closely spaced alternate valleys and crests (washboard effect); unevenness of pavement surface caused by traffic action moving surface mat forward, backward or sideways; often accompanied by "flushing".

Possible Causes:

1. Unstable granular base reflecting through the surface.
2. Excessive asphalt in surface-treated pavement resulting in low stability.
3. Transverse streaking from poor workmanship and improperly maintained construction equipment.
4. Traffic action (i.e. stop and start at intersections).

Severity:

Class	Guidelines
Slight	Noticeable washboard effect.
Moderate	Bumpy with washboard appearance or ridges and valleys.
Severe	Very bumpy with pronounced washboarding or large humps on pavement surface.

Density:

Intermittent	Less than 20% of pavement surface affected; distress spotted over localized areas only.
Frequent	20 to 50% of pavement surface affected; distress spotted evenly over length of pavement section or over localized areas only.
Extensive	51% or more of pavement surface affected; distress spotted evenly over length of pavement section.

Slight Rippling

Moderate Rippling

Severe Rippling

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• No action
	Frequent	• No action, but consider for Rehabilitation Program
	Extensive	• No action, but consider for Rehabilitation Program
Severe	Intermittent	• In Situ Recycling and Manual Chip Seal
	Frequent	• In Situ Recycling and Manual Chip Seal
	Extensive	• Rehabilitation Program

Surface Deformation

Wheel Track Rutting

Description:

Longitudinal depression left in the wheel tracks after repeated load application resulting from compaction and permanent deformation under load, and pavement materials shoving sideways. Deep ruts are often accompanied by longitudinal cracking in the wheel tracks.

Possible Causes:

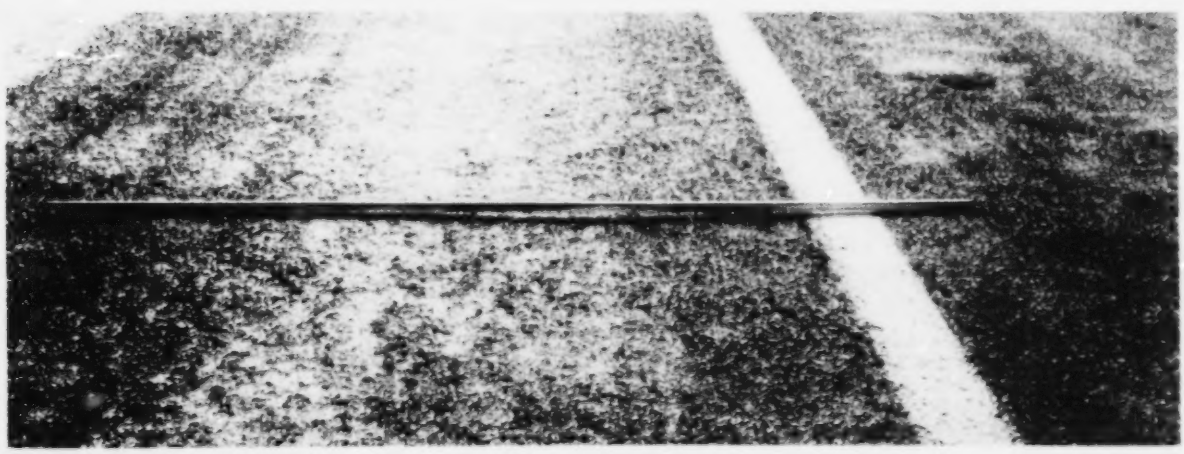
1. Poorly compacted structural layers.
2. Unstable granular bases or subbases created by positive pore water pressures under loads at times of near saturation.
3. Unstable granular shoulder: does not provide adequate lateral support.
4. Over-stressed subgrade which has deformed permanently.

Severity:

Class	Guidelines
Slight	60 to 120 mm with or without single longitudinal crack based on a 1.3 metre baseline.
Moderate	130 to190 mm with or without single longitudinal crack (may begin to have multiple longitudinal cracks) based on a 1.3 metre baseline.
Severe	200 mm upward with or without single longitudinal crack or multiple longitudinal cracks based on a 1.3 metre baseline.

Density:

Intermittent	Less than 20% of wheel tracks affected.
Frequent	20 to 50% of wheel tracks affected.
Extensive	51% or more of wheel tracks affected.



Slight Wheel Track Rutting

Moderate Wheel Track Rutting

Severe Wheel Track Rutting

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• Manual Chip Seal • Machine Chip Seal
	Frequent	• Manual Chip Seal • Machine Chip Seal
	Extensive	• Machine Chip Seal • Machine Patching • No action but consider for Rehabilitation Program
Severe	Intermittent	• Machine Patching
	Frequent	• Machine Patching • No action, but place on Rehabilitation Program
	Extensive	• Rehabilitation Program

Surface Deformation | **Distortion**

Description:

Any deviation of pavement surface from its original shape (other than described for rippling or rutting). Generally, these distortions result from settlement, slope failure, and volume changes due to moisture and frost heaving accumulating after each winter. The resulting deformation may take the form of dishing, bumps, dips, tenting or stepping at cracks, all of which give rise to pitch, roll and jarring drop in a moving vehicle.

Possible Causes:

1. Differential frost heave in poorly drained cuts and transitions.
2. Differential frost heave at pavement edges, road centre, or pavement cracks.
3. Reverse differential frost heave at culverts.
4. Differential settlement of subgrade or base materials.
5. Lack of subgrade support.
6. Embankment slope failure.
7. Improper maintenance.

Severity:

Class	Guidelines
Slight	Barely noticeable pitch and roll, or jarring drop of vehicle while in motion.
Moderate	Noticeable pitch and roll, or harsh jarring drop of vehicle while in motion.
Severe	Continuous pitch and roll, or hard jarring drop of vehicle while in motion; driver must anticipate distortion ahead and feels it necessary to reduce speed.

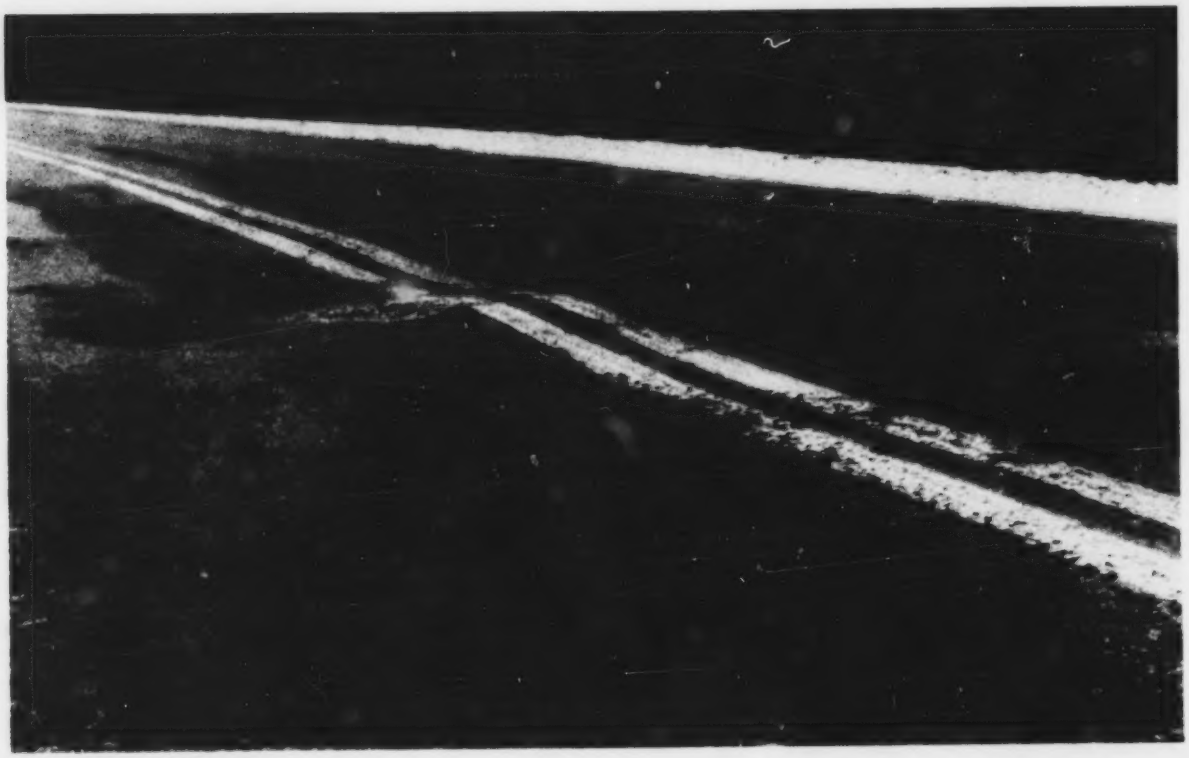
Density:

Intermittent	Less than 20% of pavement surface is affected; distress spotted over localized areas only.
Frequent	20 to 50% of pavement surface affected; distress spotted evenly over length of pavement section or over localized areas only.
Extensive	51% or more of pavement surface affected; distress spotted evenly over length of pavement section.

Slight Distortion

Moderate Distortion

Severe Distortion of Pavement Edge (Curling) from Frost Action



Severe Frost Distortion

Severe Distortion from Structural Inadequacy

Severe Distortion from Traffic Loading

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• Manual Patching • Machine Patching
	Frequent	• Machine Patching
	Extensive	• No action, but consider for Rehabilitation Program
Severe	Intermittent	• Machine Patching • In Situ Recycling with Manual Chip Seal
	Frequent	• No action, but place on Rehabilitation Program
	Extensive	• Rehabilitation Program

5.3/ Cracking

- **Longitudinal Cracking**
- **Transverse Cracking**
- **Pavement Edge Cracking**
- **Alligator Cracking**

Cracking

Longitudinal Cracking

Description:

Cracks follow a course approximately parallel to the direction of travel and are situated at or near the centre of the wheel tracks, centreline, mid-lane, etc.

Possible Causes:

1. Traffic action (loading) combined with weak pavement.
2. Poor construction equipment and/or technique.
3. Environment and climatic conditions (frost action, moisture changes, etc.).

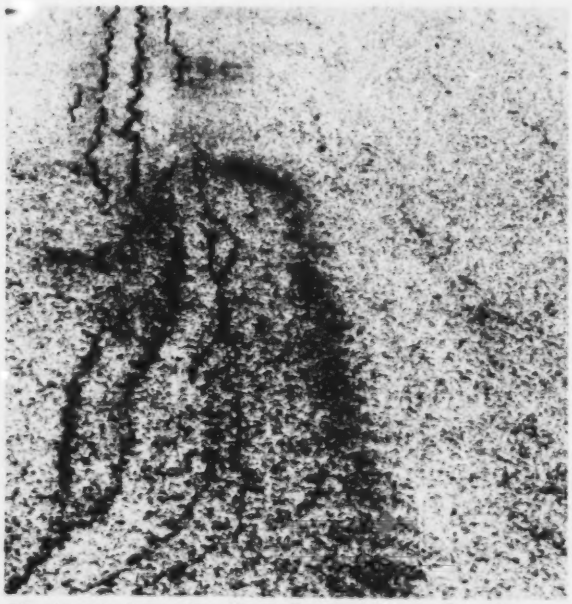
Severity:

Class	Guidelines
Slight:	Less than 12 mm single crack.
Moderate:	13 to 19 mm single crack, or multiple cracks of size up to 19 mm.
Severe:	20 mm plus single crack, or multiple cracks of size greater than 19 mm and beginning to develop spalling.

Density:

Intermittent:	Less than 20% of pavement surface affected; distress spotted over localized areas only.
Frequent:	20 to 50% of pavement surface affected; distress spotted evenly over length of pavement section or spotted over localized areas only.
Extensive:	51% or more of pavement surface affected; distress spotted evenly over length of pavement section.

Slight Longitudinal Centre-Lane Crack



Moderate Longitudinal Centre-Lane Crack

Severe Wheel Track Crack

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• Manual Chip Seal
	Frequent	• Manual Chip Seal
	Extensive	• No action, but consider for Rehabilitation Program
Severe	Intermittent	• No action
	Frequent	• No action, but consider for Rehabilitation Program
	Extensive	• No action, but place on Rehabilitation Program

Transverse Cracking

Description:

Crack follows a course approximately at right angles to the pavement centreline. Full width transverse cracks tend to be regularly spaced along the length of the road while half width transverse and part transverse cracks occur at shorter intermediate distances.

Possible Causes:

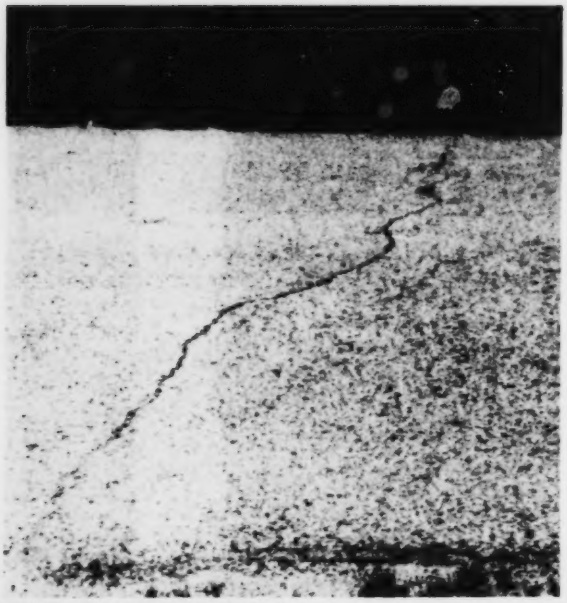
1. Natural shrinkage caused by very low temperatures.
2. Frost action.

Severity:

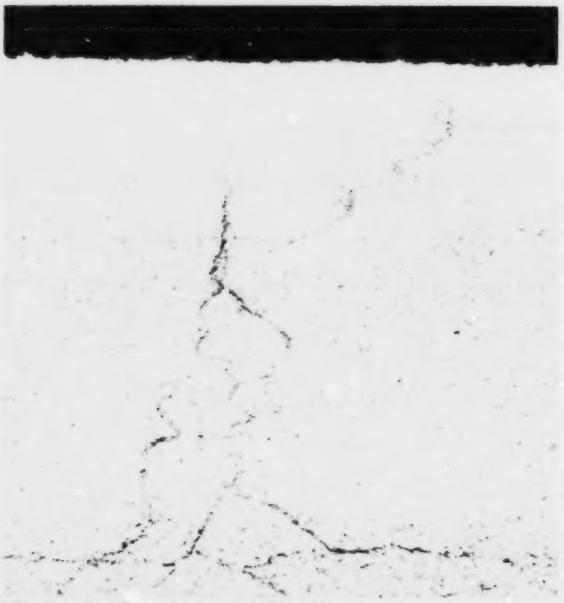
Class	Guidelines
Slight	2 to 12 mm full and single.
Moderate	13 to 19 mm single crack, or multiple cracks of size up to 19 mm with cupping or lipping starting.
Severe	20 mm plus single crack, or multiple cracks of size greater than 19 mm with cupping or lipping or spalling.

Density:

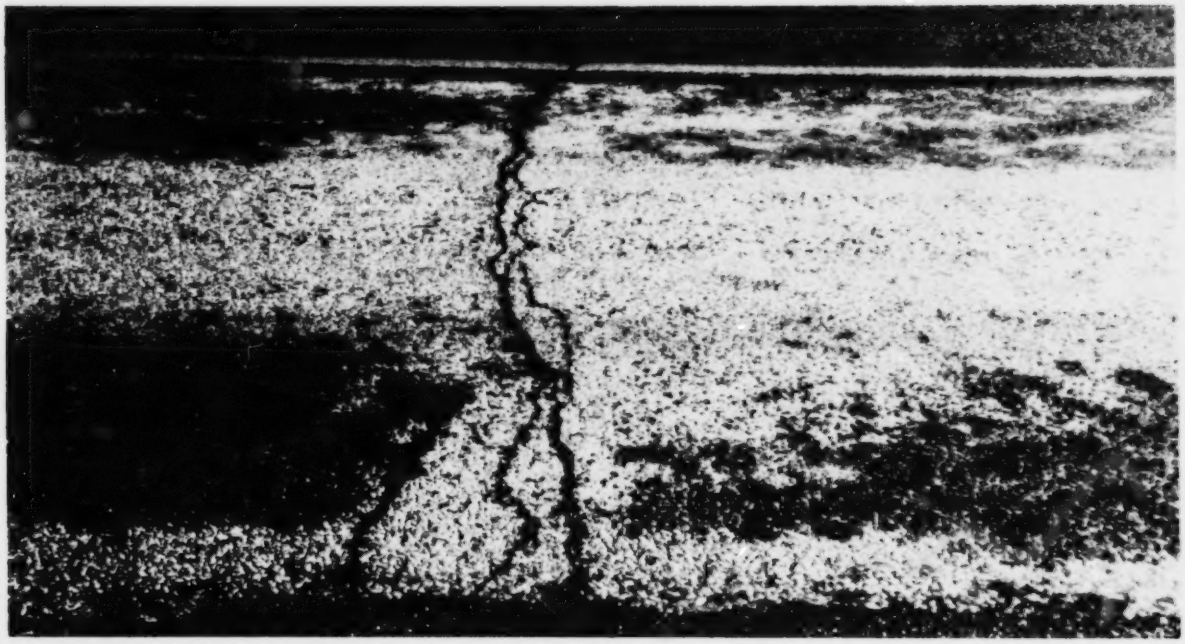
Intermittent	No set pattern, cracks 30 to 40 m apart, less than 20% of pavement surface affected; distress spotted over localized areas only.
Frequent	A set pattern, cracks 20 to 30 m apart, 20 to 50% of pavement surface affected; distress spotted evenly or over localized areas.
Extensive	Regular pattern, cracks 10 to 20 m apart, 51% or more pavement surface affected; distress spotted evenly over length of pavement section.



Slight Transverse Crack



Moderate Transverse Crack



Severe Transverse Crack

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• Seal if single crack only with emulsified asphalt
	Frequent	• Seal if single crack only with emulsified asphalt
	Extensive	• Seal if single crack only with emulsified asphalt • Rehabilitation Program should be considered
Severe	Intermittent	• Seal if single crack only with emulsified asphalt
	Frequent	• No action, but consider for Rehabilitation Program
	Extensive	• No action, but place on Rehabilitation Program

Pavement Edge Cracking

Description:

Crack is parallel to and within 300 mm of the pavement edge and is either a straight continuous crack or consists of crescent shaped cracks in a wave formation. Pavement edge cracking will progressively encroach into the outer wheel tracks through the middle of the pavement lane and may even progress right across the centreline.

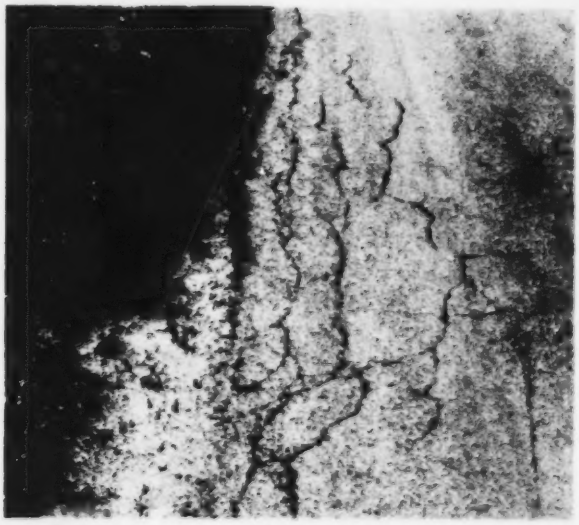
Possible Causes:

1. Frost action.
2. Insufficient bearing support and/or excessive traffic loading at the pavement edge.
3. Poor drainage at pavement edge and shoulder.
4. Inadequate pavement width forces traffic too close to pavement edge.

Severity:	Class	Guidelines
	Slight	Less than 300 mm from pavement edge; single or two parallel cracks.
	Moderate	Extending over 300 mm but less than 900 mm from pavement edge; multiple cracks with connecting cracks.
	Severe	Extending over 900 mm from pavement edge; alligatoring of pavement at and near pavement edge.

Density:		
	Intermittent	Less than 20% of pavement edge affected; distress spotted over localized areas only.
	Frequent	20 to 50% of the pavement edge affected; distress spotted over localized areas or evenly over pavement section length.
	Extensive	51% or more of the pavement edge affected; distress spotted evenly over pavement section length.

Slight Pavement Edge Crack



Moderate Pavement Edge Crack

Severe Pavement Edge Crack (Progress Into Centre of Lane)

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• No action
	Frequent	• No action
	Extensive	• No action
Moderate	Intermittent	• No action
	Frequent	• No action
	Extensive	• Manual Chip Seal
Severe	Intermittent	• Manual Chip Seal
	Frequent	• Manual Chip Seal
	Extensive	• No action, but place on Rehabilitation Program

Alligator Cracking

Description:

Cracks forming from a network of multi-sided (polygon) blocks resemble the skin of an alligator. The block size can range from a few millimetres to about 300 mm.

Alligator cracking is a consequence of the inability of a part of the structure to support the repeated loads due to a "softening" of the material. "Softening" is normally associated with an increase in moisture content. Therefore, cracks (such as transverse, centreline and longitudinal) left unsealed allow surface water to penetrate the pavement structure and cause "softening" and then alligatoring as the final stage of crack development.

Alligator failures are progressive. For example, under traffic and rain they tend to spread rapidly; traffic also causes blocks of surfacing to be displaced and broken up. The only successful remedial treatment is the removal of all softened material in the affected area and replacement with sound granular material.

Possible Causes:

1. Insufficient bearing support.
2. Poor base drainage.

Severity:

Class	Guidelines
Slight	Alligator pattern established with or without corners of polygon blocks fracturing; distortion less than 13 mm.
Moderate	Alligator pattern established with or without spalling of polygon blocks; distortion 13 to 25 mm.
Severe	Polygon blocks begin to lift; small potholes; distortion greater than 25 mm.

Density:

Intermittent	Less than 20% surface area of pavement section affected; distress spotted over localized areas only.
Frequent	20 to 50% surface area of the pavement section affected; distress spotted evenly over the length of pavement section or over localized areas.
Extensive	51% or more surface area of the pavement section affected; distress spotted evenly over pavement section length.

Slight Alligator Crack

Moderate Alligator Crack

Severe Alligator Crack

Possible Remedial Measures

Evaluation		Suggested Remedial Measures
Severity	**Density**	
Slight	Intermittent	• Manual Chip Seal
	Frequent	• Manual Chip Seal
	Extensive	• Manual Chip Seal • Machine Patching
Moderate	Intermittent	• Manual Patching • Machine Patching
	Frequent	• Machine Patching
	Extensive	• Machine Patching • No action, but consider for Rehabilitation Program
Severe	Intermittent	• Manual Patching • Machine Patching
	Frequent	• Manual Patching • Machine Patching • No action, but place on Rehabilitation Program
	Extensive	• Rehabilitation Program

6/ Shoulder Distress Manifestations

Encroaching Growth

Poor Cross-Fall

Shoulder Distress

Encroaching Growth

Description:

Vegetation growth over runs shoulder and reaches or approaches close to pavement edge.

Possible Causes:

1. Shoulder too narrow.
2. Improper maintenance practice.

Possible Consequences:

1. Impede surface run off to ditches.
2. Retain excess moisture on pavement edge which may lead to edge cracks or breakage.

Encroaching Vegetation Growing at and near the Pavement Edge

Shoulder Distress

Poor Cross-Fall

Description:

Shoulders higher than pavement resulting in trapped surface water on the pavement edge or on shoulder immediately adjacent to it.

Possible Causes:

1. Improper cross-fall design.
2. Improper maintenance practice.

Possible Consequences:

1. Impede surface run-off to ditches.
2. Retain excess moisture on pavement edge which may lead to soft shoulders, edge cracks or breakage.

Shoulder higher than Pavement Surface trapping Surface Water at Pavement Edge

Shoulder higher than Pavement Surface trapping Surface Water at Pavement Edge

7/ Maintenance Treatment Alternatives

Treatment Alternatives

Manual Patching

Machine Patching

In Situ Recycling with Manual Chip Seal

Manual Spray Patching

Manual Chip Seal

Machine Chip Seal

Fog Seal

Manual Burn and Seal

Treatment Alternatives

Description:

When pavement distress leads to a rough surface condition, or to a locally dangerous bump or hole, maintenance is undertaken to:

- seal the surface to prevent water from reaching the susceptible layers;
- smooth the roughened surface; or
- cure the cause of the bump or hole.

Maintenance is undertaken also as a long-term preventive measure to:

- seal the surface to prevent water from reaching the susceptible layers;
- strengthen the structurally inadequate section(s); or
- provide additional drainage facilities to remove any excess moisture from the structure.

A number of maintenance treatment alternatives are listed and illustrated. These treatments are matched against each distress manifestation for possible maintenance action. However, the suggestion given may not effectively correct the causes of the distress: the suggested treatment may only be an expedient measure to slow the distress deterioration.

Patching will cover and hide pavement distress. However, condition reports on the extent and type of patching, when reviewed over a period, will tend to indicate whether the pavement deficiency is due to structural inadequacy, faulty materials, or another deficiency.

In reporting on the presence of patches, the density of occurrence should be estimated using the terms given in the standard Density table.

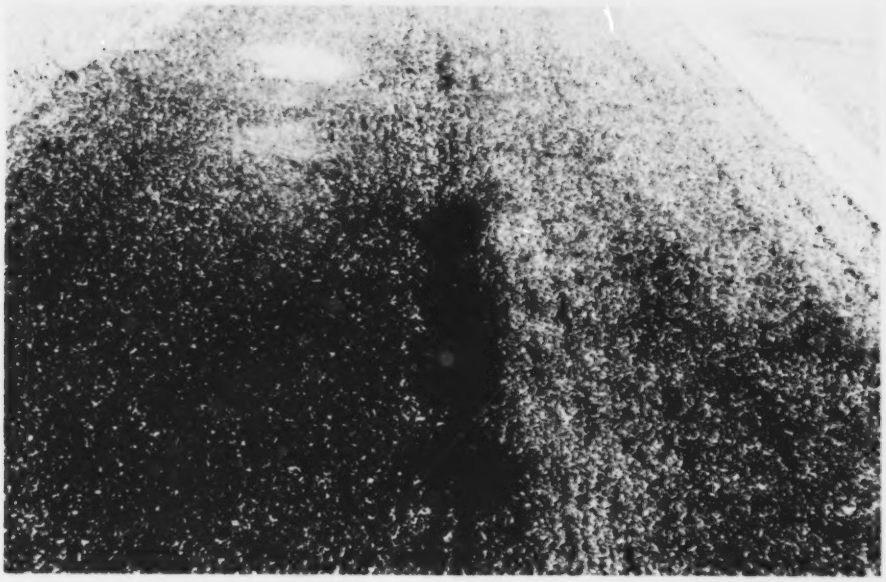
Maintenance

Manual Patching

Description:

The manual placing and spreading of premixed asphaltic materials (hot, cold, or recycled mix) to repair potholes, bumps, depressions and other pavement distresses. Includes preparation of patching area and compaction with or without mechanical aids.

Manual Patching with Cold-Mix Asphalt



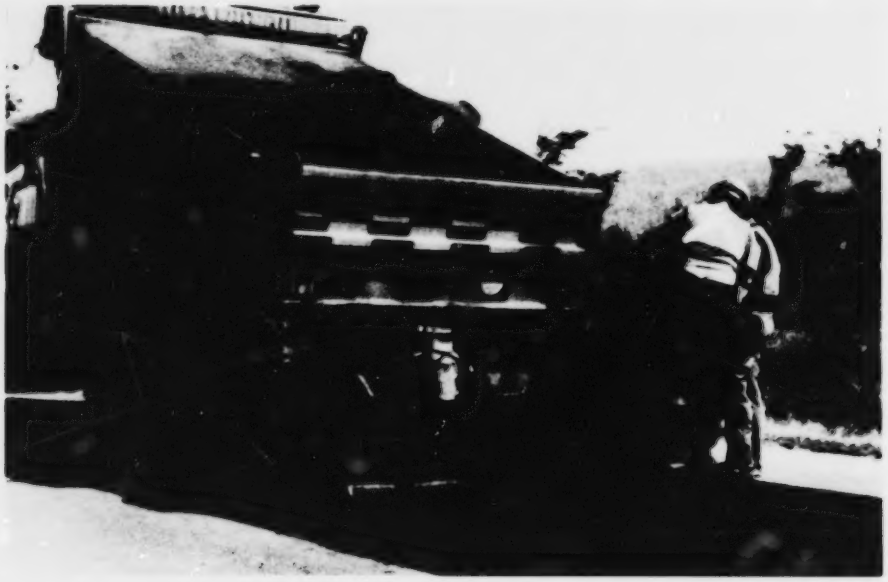
Maintenance

Machine Patching

Description:

The machine placing and spreading of premixed asphaltic materials (hot, cold mix) to repair major surface distresses such as alligator cracking, wheel track rutting, distortion, etc.; includes preparation of patching area and compaction with mechanical compactor(s).

Machine Patching with Hot-Mix Asphalt



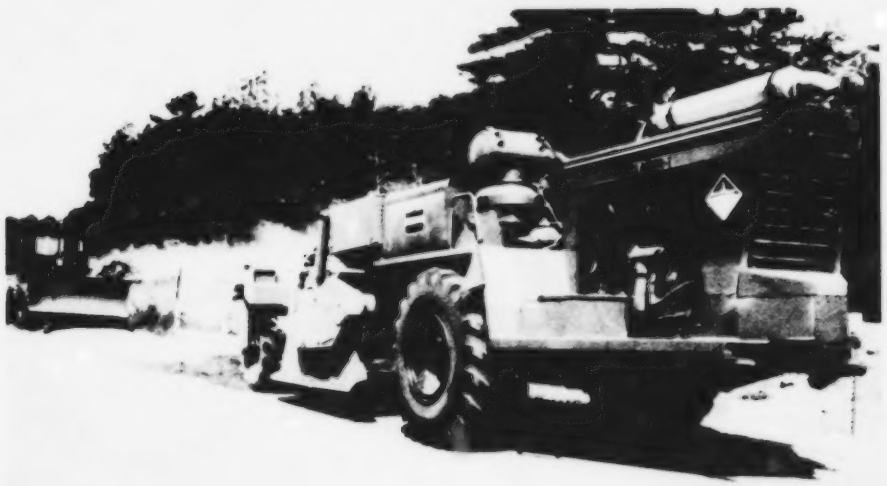
Maintenance

In Situ Recycling with Manual Chip Seal

Description:

The machine removal of pavement surface defects such as distortion, followed by manual chip seal of recycled areas; includes preparation of patching area and compaction with mechanical compactor(s).

In Situ Recycling



Manual Spray Patching

Description:

The manual application of emulsified asphalt to localized areas of pavement distresses, followed by spreading of aggregate (stone chip or sand) by hand.

Manual Spray Patching

Maintenance

Manual Chip Seal

Description:

The manual application of emulsified asphalt with a Mini Spray Bar to localized areas of pavement distresses, followed by spreading of selected aggregate (washed stone chips) with a chip spreader and compacted with a mechanical compactor.

Manual Chip Seal with Mini Spray Bar and Chip Spreader

Rolling of Stone Chip as Standard Work Procedure

Manual Chip Seal Repair

Maintenance

Machine Chip Seal

Description:

The machine application of emulsified asphalt to localized areas of pavement distresses, followed by machine spreading of selected aggregate and compacted with mechanical compactor(s).

Machine Chip Seal

Machine Chip Seal Treatment

Machine Chip Seal

Machine Chip Seal Treatment

Maintenance

Fog Seal

Description:

The machine application of slow-setting asphalt emulsion diluted with water to renew asphalt surfaces and to seal small cracks and surface voids, etc.; sometimes followed by machine spreading of sand, but not usually.

Fog Sealing

Maintenance

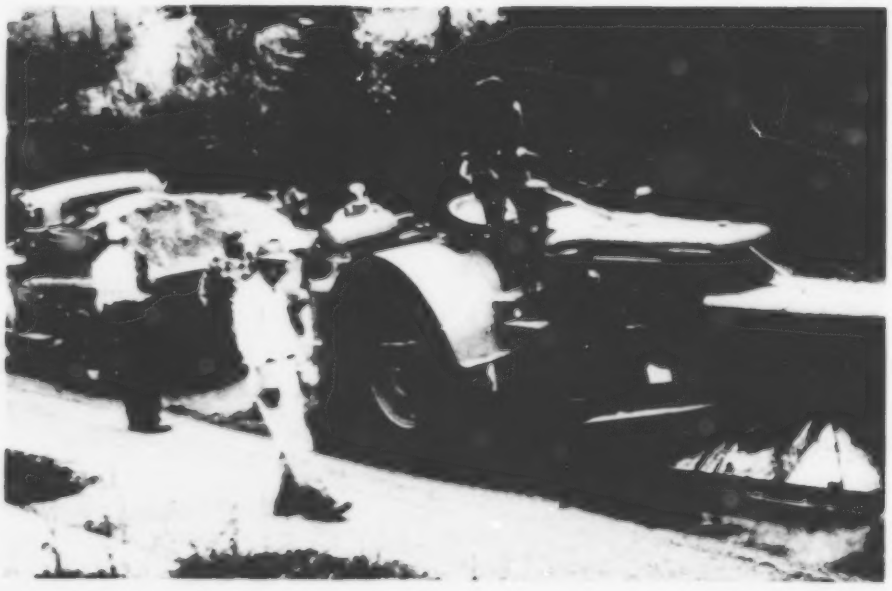
Manual Burn and Seal

Description:

The elimination of excess surface asphalt by open flame burning unit and sealed with heated aggregate or Manual Chip Seal.

Asphalt Pavement Burner

Burn and Seal Treatment



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[2] **Chong, G.J., Phang, W.A., Wrong, G.A.,** *Manual for Condition Rating of Rigid Pavements — Distress Manifestations*, Report SP-005, Ministry of Transportation and Communications, Ontario, Canada, 1977.

[3] **Phang, W.A., Chong, G.J.,** "Ontario Flexible Pavement Distress Assessment for use in Pavement Management," Report PAV-81-01, Ministry of Transportation and Communications, Ontario, Canada, 1981. Presented at the Transportation Research Board, Washington, D.C., 1982. Also presented at the Canadian Technical Asphalt Association Conference, Edmonton, Alberta, November, 1982.

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[5] **Chong, G.J.,** "A Rideability Rating Experiment," Report IR-19, Ministry of Transportation and Communications, Ontario, Canada, 1968.

[6] **Chong, G.J., Jewer, F.W., Macey, K.,** *Pavement Maintenance Guidelines — Distresses, Maintenance Alternatives and Performance Standards*, Report SP-001, Ministry of Transportation and Communications, Ontario, Canada, 1980.

[7] **Chong, G.J., Phang, W.A., Jewer, F.W.,** "Choosing Cost-Effective Maintenance," Report PAV-80-03, Ministry of Transportation and Communications, Ontario, Canada, 1980. Presented at the Roads and Transportation Association of Canada, Toronto, 1980. Also presented at the Annual Meeting of the Transportation Research Board, Washington, D.C., 1981.

[8] **The Asphalt Institute,** "Asphalt in Pavement Maintenance," Manual Series No. 16 (MS-16), March, 1983.

[9] **Cooper, J., Aquin, R.,** "How to Achieve a Good Surface Treatment," Report MI-57. Ontario Ministry of Transportation and Communications, 1984.

Appendix A/
A Guide for Completing the "Surface-Treated Pavement Condition Evaluation Form"

Pavement Identification

1. **Location -** A written description of the beginning (From) and the ending (To) of the section.

   The From - To direction must be in the direction of increasing Linear Highway Reference System (LHRS) numbers, i.e., from south to north and from east to west and the direction is independent of traffic direction.

   The basic description that is already used and stated in the LHRS listing should be used whenever possible. If the LHRS listing shows several descriptions for one LHRS number, choose the description that is most easily recognizable in the field.

   An additional description, such as landmarks and buildings, may be added to the basic description. This information will also be stored by the computer and may help to locate the section in the field.

2. **LHRS (Begins) and (Offset) -** Linear Highway Reference System Number and Offset distance in kilometres for the beginning (From) of the section.

3. **Section Length -** The length of the section in kilometres.

4. **Traffic Direction -** The direction traffic moves on the section. If the evaluation is for all lanes (e.g., a 2-lane highway), use the code B, meaning BOTH directions. If only one lane of the 2-lane highway is evaluated, record the appropriate traffic direction code.

5. **District -** Number of the District in which the section is located. Enter the information right justified. For example, District 9 would be as:

	9

6. **Highway -** Enter the highway number and make it right justified. For example, Highway 15 would be entered as:

		1	5

   If the section has more than one highway number, for example, Hwy 35/115, use the lowest of the two numbers. However, if the section in question overlaps with a freeway, the freeway (400 series) number should be used. Highway numbers may also be entered alphanumerically:

		7	A

7. **Survey Date -** The year and month in which the section was evaluated.

8. **PCR -** Pavement Condition Rating. Table B-1 is a guide for estimating the PCR number on a scale from 0 to 100.
   Note that the PCR may be discontinued in future and be replaced by Pavement Condition Index (PCI). (See also RCR).

9. **RCR** - Riding Condition Rating. The RCR of the section can be determined by driving over the pavement at 80 km/h and subjectively rating the ride using the scale given on the form.

10. **Contract Number** - The last contract number. This requires a 5-digit number. If the section covers more than one contract, the additional contract may be recorded under "Other Comments". If the contract number is not available, leave it blank.

11. **W.P. Number** - The Work Project Number should always be entered if it's available.

Pavement Evaluation

1/ Riding Condition Rating:

Riding condition rating is an indicator of how well the pavement serves the travelling public and is measured subjectively in terms of pavement surface roughness as experienced by the rater. It is a measure related to road user condition, cost and safety and is therefore referred to as the Functional Pavement Performance (4).

Riding condition rating of the evaluation section is made by the rater driving over the pavement at the posted speed and the appropriate rating is recorded in the proper space in the evaluation form (Figure A-1).

2/ Pavement Surface Distress Manifestations

Pavement evaluation is also made in terms of pavement distress which may cause accelerated loss of pavement serviceability and/or distresses which may trigger pavement maintenance actions.
It is a measure related to the structural adequacy of the pavement and the cost of maintaining and preserving the capital investment of the road structure, and is therefore referred to as the Structural Pavement Performance (4).

Pavement surface distress manifestations are evaluated by the rater walking and/or driving slowly over the evaluation section and checking off all the pavement distress manifestations in their appropriate spaces (Figure A-1).

The pavement distresses are listed under three subgroups:

a/ **Pavement Surface Defects**
- Loss of Cover Aggregate
- Streaking
- Flushing
- Potholes
- Pavement Edge Break

b/ **Pavement Surface Deformation**
- Rippling
- Wheel Track Rutting
- Distortion

c/ **Pavement Cracking**
- Longitudinal
- Transverse
- Pavement Edge
- Alligator

Pavement Shoulder Evaluation

Although pavement shoulder condition has no influence on the Pavement Condition Rating, it can affect pavement serviceability.

Shoulder distress manifestations, however, are difficult to evaluate because of the changeable state of gravel or earth shoulders usually constructed for surface-treated roads. Therefore, the distress is evaluated solely according to its density (see Chapter 6) and identified as the "Right" or "Left" shoulder by the direction of the highway.

On the road running from south to north, the shoulder on the east side is always "Right". On a road running from east to west, the shoulder on the north side is always "Right".

The shoulder distresses are listed as:

- Encroaching Growth
- Poor Cross-Fall

Shoulder distresses are evaluated by the rater in the same manner as evaluating pavement surface and the distress is checked off in its appropriate spaces on the form (Figure A-1).

Maintenance Treatment Evaluation

Maintenance treatment should be reported by its type and the extent of occurrence by checking off the appropriate spaces (Figure A-1). The maintenance treatment alternatives listed on the form are fully described in Chapter 7.

The extent and type of maintenance treatment is generally indicative of how well the pavement performs both functionally and structurally. Therefore, it is important that this information is made available through proper recording.

Pavement Condition Rating (PCR)

Pavement Condition Rating is a subjectively derived rating number describing the level of serviceability based on the evaluation of the pavement riding quality and surface distresses (distortion, cracking alligatoring, etc.). It is an assessment of the overall pavement performance both functionally and structurally as related to actual observable pavement characteristics: roughness and distress manifestations.

Surface-Treated Pavement Condition Evaluation Form

Location From _____ To _____

LHRS [ ][ ][ ][ ][ ] BEGINS [ ][ ].[ ] OFFSET km

Section Length [ ][ ].[ ] LENGTH km

District [ ][ ]

Survey Date [ ][ ] YEAR [ ][ ] MONTH

PCR [ ][ ][ ]

RCR [ ].[ ]

Highway [ ][ ][ ][ ]

Contract No. [ ][ ] – [ ][ ][ ]

WP No. [ ][ ][ ][ ] – [ ][ ] – [ ][ ][ ]

Traffic Direction [ ]

B: Both Directions
N: North Bound
S: South Bound
E: East Bound
W: West Bound

Riding Quality Rating (At Posted Speed)

10	8	6	4	2	0
Excellent	Good	Fair	Poor	Very Poor	
Smooth and Pleasant	Comfort-able	Uncomfort-able	Very Rough and Bumpy	Dangerous at Posted Speed	

Pavement Distress Manifestation			Severity of Distress			Density of Distress % Extent of Occurrence		
			Slight	Moderate	Severe	Intermittent	Frequent	Extensive
			1	2	3	<20 1	20-50 2	>50 3
Surface Defects	Loss of Cover Aggregate	1						
	Streaking	2						
	Flushing	3						
	Potholes	4						
	Pavement Edge Break	5						
Surface Deformation	Rippling	6						
	Wheel Track Rutting	7						
	Distortion	8						
Cracking	Longitudinal	9						
	Transverse	10						
	Pavement Edge	11						
	Alligator	12						

Shoulder Distress	Density of Distress % Extent of Occurrence			
	Right		Left	
	10 - 30 1	>30 2	10 - 30 1	>30 2
Encroaching Growth				
Poor Cross-fall				

Maintenance Treatment for Pavement	Extent of Occurrence %		
	<20 1	20-50 2	>50 3
Manual Patching			
Machine Patching			
In Situ Recycling			
Manual Spray Patching			
Manual Chip Seal			
Machine Chip Seal			
Fog Seal			
Manual Burn & Seal			

Distress Comments (Items not covered above) _____

Other Comments (e.g. subsections, additional contracts) _____

Evaluated by: _____

Figure A-1/ Field Check-Off Sheet

Appendix B
A Guide for Completing the "Pavement Condition Report Form"

District No.

Number only of district: 1 to 20.

Hwy No.

If highway location has more than one number, list all with the lowest number first, e.g., 7, 15, and 29.

W.P. No.

List the current work project number if available.

Length

Indicate the length in kilometres and decimals of a kilometre. If a discrepancy occurs between the distance table or map distance and actual car distance, use actual car distance if odometer reads correctly.

Location

The location should be referenced to the junction of highways or secondary highways, or to city or town limits. Do not refer to small villages, rivers, municipal boundaries or other landmarks which are not readily identifiable on the official road map.

The sections should run from east to west or from south to north. The current MTO Reference System number of the closest numbered location to the east or south of each end of the project should be given, together with the offset distance from this location (if any).

Last Contract No.

Indicate the number or numbers of previous contracts on the section of highway. This information will be used for input and retrieval from PAMFIS.

RCR (Riding Condition Rating)

Indicate the Riding Condition Rating to one decimal place based on the assessment of the ride at posted speed, e.g., 6.4. The following scale should be used:

10 to 8 Excellent

8 to 6 Good

6 to 4 Fair

4 to 2 Poor

2 to 0 Very Poor

Pavement

Type: Indicate surface type only, i.e., surface treatment.

Width: Measure with tape at the time of survey. If variable, show minimum and maximum widths.

Shoulders: Estimate width or, if variable, show minimum and maximum widths.

Traffic

Indicate the year of the traffic count, AADT and SADT, and the percentage of truck traffic if known.

Soils Data

Indicate the topography and soil types. This information may be supplemented by reference to Putnam and Chapman or to regional soil maps, if necessary.

Pavement Structure Data

Indicate any spray patching, hot-mix patching, or other maintenance repair work carried out and the approximate year the work was done.

Performance and Condition

This should be indicated by a detailed summary of the riding quality surface defects, distortion and cracking. The Manual for Condition Rating of surface-treated pavements describes riding quality and various forms of pavement distress, and details the terminology to be used to describe them. The descriptive terms used in the manual have been standardized and should be strictly followed to allow accurate comparison of information from various sources.

Remarks

This section should include general comments on points such as:
- type of W.P. if this has been assigned,
- possible changes in type or volume of traffic,
- frost heaves,
- ditching,
- safety features,
- alignment, and
- possible combination with other projects.

If deflection or rebound measurements have been made to assess the strength of the pavement, the results should be indicated here. The type of measurement should be noted, i.e., Dynaflect, Benkelman Beam, etc. The data should be presented in standard form (i.e., average deflection plus two times standard deviation value). The time of survey should be noted to indicate whether the data represents the maximum spring rebound values, or if the data was taken from a single survey at some other time of year.

Roughness measurements, if any, should be indicated showing the type of machine used and the data–usually in millimetres per kilometre.

Skid resistance measurements should be shown indicating skid number values and the speed at which the skid number was assessed. The method of measurement should be indicated (i.e., brake force trailer or stereo photographs).

Proposed Remedial Measure

Indicate if patching or other maintenance measures will be adequate, and indicate the year when these should be carried out. If rehabilitation is proposed, indicate the proposed rehabilitation design.

Program Year

Indicate the present program year, if any, and any suggested changes. If work is required within the 5-year period, indicate the year. If no work is required at present, estimate whether work will be required in 5 to 10 years or after 10 years. This estimate is of value to the Highway Program Administration Office.

Date of Survey

Indicate the day, month and year.

Distribution

Distribution is made to Regional Staff. Copies should be sent to the District Office and to the appropriate Head Office staff in the:

- Design Evaluation and Pavement Section,
- Reference and Inventory Systems Section, and
- Highway Project Control Section.

Figure B-1 Pavement Condition Report Form

Ministry of Transportation of Ontario

Regional Geotechnical Section

Pavement Condition Report

Condition Rating

District No._____Hwy. No.____W.P. No._____Length_____

Location:_____

Reference No. From _____ To_____ Last Contract No._____

Offset Distance _____ _____ R.C.R _____

Pavement: Type _____ Width_____ Shoulder: Width _____

Traffic: Year _____ A.A.D.T. _____ S.A.D.T._____ % Trucks_____

Soils Data:

Pavement Structure Data:

Maintenance and Condition:

Performance and Condition:

Remarks:

Proposed Remedial Measures:

Program Year: Present_____ Suggested _____

Date of Survey: _____ Prepared by _____

Table B-1

A Guide for the Estimation of Pavement Condition Rating and Associated Maintenance Rehabilitation Strategies for Surface-Treated Roads.

Pavement is in excellent condition with just a few bumps or depressions from slight surface deformation. No surface defects such as streaking, potholes or cracking distresses. Ride is very good (8 - 10).	80 - 100	Routine maintenance.
Pavement is in good condition with just a few bumps or depressions from slight to moderate surface deformation. Intermittent slight to moderate surface defects and/or cracking distresses. Ride is good (6 - 8).	60 - 79	Corrective maintenance on an annual basis or sooner when necessary.
Pavement is in fair condition with intermittent to frequent bumps or depressions from slight to moderate surface deformation. Intermittent to frequent moderate surface defects and/or cracking distresses. Ride is fair (4 - 6).	40 - 59	Corrective maintenance to hold serviceability level on a semi-annual basis or sooner when necessary. May be candidate for major corrective maintenance as holding strategy depending on performance level and history. Candidate for rehabilitation program in 3 to 5 years.
Pavement is in poor condition with frequent bumps or depressions from moderate surface deformation. Frequent moderate to severe surface defects and/or cracking distresses. Localized slight to moderate alligatoring crack may be present indicating pavement structural failure. Ride is poor (2 - 4).	20 - 39	Corrective maintenance to retard rapid deterioration of serviceability level. Candidate for rehabilitation program in 1 to 3 years.
Pavement is in very poor condition with extensive bumps or depressions from moderate to severe surface deformation. Extensive to severe surface defects and/or cracking distresses. Frequent slight to moderate alligatoring may be present, indicating pavement structural failures. Ride is very poor (0 - 2).	0 - 19	Corrective maintenance when and where necessary to maintain minimal safety and serviceability level. Rehabilitation within 1 year.